Hybrid model of Vlasov-Poisson equations and comparison of hamiltonian method and Lawson method

Anaïs Crestetto[*]   Nicolas Crouseilles[†]   Josselin Massot[‡]

October 19, 2020

Abstract

In this talk, we consider a hybrid fluid-kinetic model as an approximation of the Vlasov-Poisson equation. This hybrid model is based on the assumption that the dynamic of cold and hot particles are separated. The small parameter is the ratio between the temperature of the cold and the hot particles, which have an incidence on the velocity grid. We check numerically the validity of the hybrid model versus the full kinetic model. The hybrid model is discretized by means of two time integrators. First, we exploit the hamiltonian structure of the hybrid model by constructing a hamiltonian splitting. Second, the linear character of the cold particles of the model motivates the use of exponential integrator. These two time integrators, coupled with an adaptive time step strategy, are compared with the full kinetic result and with the dispersion relation.

[*]Université de Nantes, France
[†]Inria-Rennes Bretagne Atlantique, MINGuS Project & Université de Rennes 1 & ENS Rennes, France
[‡]Université de Rennes 1 & Inria-Rennes Bretagne Atlantique, MINGuS Project, France

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